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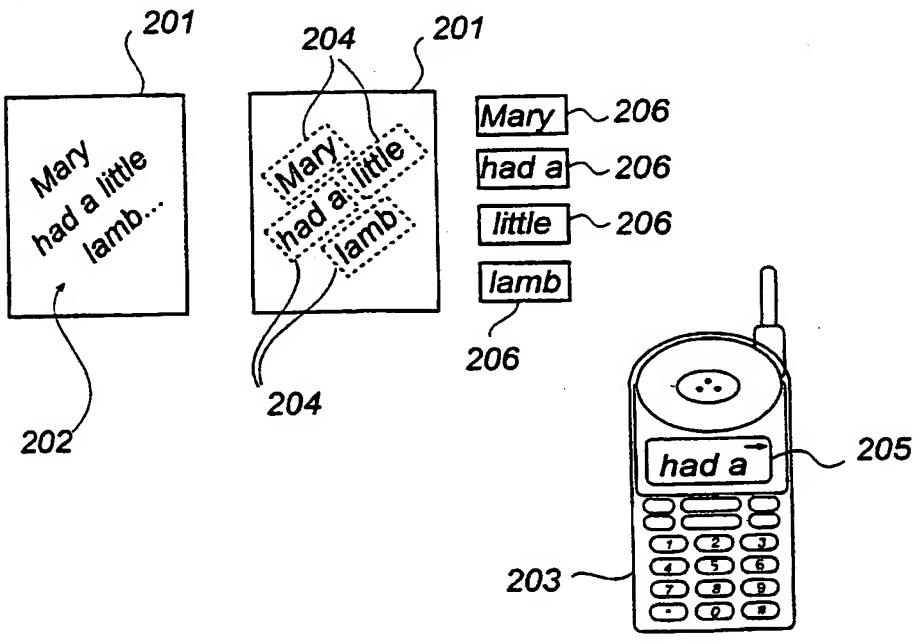
(54) Title: METHOD AND ARRANGEMENT FOR TRANSFERRING MESSAGES



(57) Abstract: The present invention relates to methods and corresponding arrangements in mobile stations or mobile telephone systems for processing primary information objects, containing a graphical representation of handwritten messages. The methods comprise the following steps: identifying image areas in a primary information object, the size of the image areas being based on the display characteristics of a display on which the message is intended to be shown, and the image areas containing parts of a handwritten message; and creating at least one secondary information object containing at least one of said image areas.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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METHOD AND ARRANGEMENT FOR TRANSFERRING MESSAGES

Field of the Invention

The present invention relates to a method in a mobile telephone system and methods in a mobile station. The invention also relates to an arrangement in a mobile telephone system and arrangements in a mobile station. The invention also relates to a method for processing an information object which contains a graphical representation of a handwritten message and a storage medium for digital information.

Background of the Invention

A service used to a large extent in the GSM mobile telephone system is short text messages, more often called SMS (Short Message Service). SMS allows subscribers of the system to send text messages with a length of up to 160 characters from one mobile station to another. An SMS message can also be sent from a personal computer via an SMS server to a mobile station or in the opposite direction in the form of an e-mail message. A receiving mobile station does not need to be switched on when the message is sent, the message can be stored in the mobile telephone system until the mobile station is connected.

In spite of the limited format, SMS has become very popular. GSM is considered to be a second-generation mobile telephone system and is primarily set up for pro-

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viding circuit-switched voice communication services. In a third-generation mobile system, more often known by acronyms such as WCDMA or CDMA-2000, also packet data services with large bandwidths will be provided. The same applies to upgrades of a second-generation mobile telephone system, for example GPRS and EDGE. A very obvious advantage of broadband packet data services is the possibility of transferring files, which contain graphics.

If there is a possibility of transferring graphical information, the transfer of handwritten messages produced by digital means is also made possible. The text messages can thus be made more individual. Moreover, characters, which are known by the sender and the receiver, can be transmitted even if the mobile stations and the intermediate system/systems are not adapted for such characters. For example, Japanese characters can be sent by mobile stations adapted for the Latin alphabet.

One difficulty associated with the transfer of such a message is that the displays of the mobile stations are often relatively small. This usually makes it impossible to show a complete file, for example in GIF format. A message, which contains a digital graphical representation of a handwritten message of some length and recorded with some resolution, will normally be many times larger than the display of the receiving mobile station. It can also be assumed that a handwritten message will be written sparsely with respect to the surface area, compared with a message of the SMS type.

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A conceivable possibility of showing the message is to reduce it in size until it can fit into the display of the mobile station. One problem with such a method is that the resolution in the display of most mobile stations is so low that most of the messages would be unreadable, especially if the sender has a dense handwriting.

Another conceivable method is to show only a small part of the image file and allow the receiver to step on, up/down/to the right/to the left through the image with the keys of the mobile station. However, this is difficult and cumbersome. In addition, there is no guarantee that the message is oriented horizontally in the image, it may well be written diagonally in the image file. If this is so, the displaying of the message will be even more complicated. If the receiver steps through the image, there is also a risk that some of the message will be bypassed, for example if it is positioned down in one corner.

Brief Description of the Invention

It is an object of the present invention to wholly or partially avoid the above-mentioned problems.

This object is achieved by means of a method in a mobile telephone system according to claim 1 and a corresponding arrangement according to claim 8; a method in a receiving mobile station according to claim 6 and a corresponding arrangement according to claim 9; and a method in a transmitting mobile station according to

claim 7 and a corresponding arrangement according to claim 10. The object is also achieved by means of a method for processing a primary information object according to claim 11 and a digital storage medium containing a computer program according to claim 12.

According to a first aspect of the invention, a method is provided in a mobile telephone system where a node, connected to the system, is adapted to forward incoming primary information objects, such as files, to a mobile station which is wirelessly connected to the system. When a primary information object, which contains a graphical representation of a handwritten message, arrives, the following steps are carried out in accordance with the invention. First, the mobile telephone system identifies display characteristics of the receiving mobile station. After that, image areas in the primary information object are identified, with a size based on the identified display characteristics, the areas containing parts of the message. These image areas are then placed in one or more secondary information objects, such as files, after which the secondary information object/objects is/are transferred to the mobile station. As a result of this method, the mobile station can now show parts of the transmitted message, which is just the right size. The result is that the message can be shown with good resolution and with only a small number of, or perhaps no, button depressions. A diagonally written message

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can be shown with an orientation, which is correct for the mobile station.

The identification of display characteristics preferably comprises the following steps: transmitting of a request for display characteristics to the mobile station, and receiving information about display characteristics from the mobile station. This enables the method to be carried out even if the hardware identity of the receiving station is unknown to the system.

According to another embodiment, the identification of display characteristics comprises the following steps: obtaining a hardware-identifying identity number relating to the mobile station, and utilizing a lookup table for obtaining, with the identity number as input data, information about the display characteristics. This enables the method to be carried out without previous communication with the mobile station.

The content of the primary information object is preferably produced by displacing an optical sensor in relation to a position-coding pattern, the sensor being adapted to detect absolute positions in the pattern. This enables utilization of a very large input area.

In addition, a corresponding arrangement for carrying out the method described above is provided.

According to a second aspect of the invention, a method is provided in a mobile station communicating with a mobile telephone system, the mobile station receiving information from the telephone system. The method is

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then characterized by the following steps, when the first incoming primary information object contains a graphical representation of a handwritten message; identifying image areas, with a size based on display characteristics of the mobile station, in the first incoming primary information object, the image areas containing parts of the message, and showing at least one of the image areas in a display of the mobile station. The advantages of this method are apparent from the above discussion. This aspect of the invention also corresponds to an arrangement and can be varied to a large extent like the first aspect.

According to a third aspect of the invention, a method is provided in the first mobile station communicating with a mobile telephone system, the first mobile station sending information via the mobile telephone system. A first primary information object is intended to be transmitted to a second mobile station via the mobile telephone system. The method is characterized, when the first primary information object contains a graphical representation of a handwritten message, by the following steps: requesting display characteristics of the second mobile station; identifying image areas, with a size based on the display characteristics, in the first information object, the image areas containing parts of the message; creating at least one secondary information object containing at least one of the image areas; and con-

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veying the secondary information object to the second mobile station.

This aspect of the invention also corresponds to an arrangement and can be varied to a large extent like the first aspect.

According to a fourth aspect of the invention, a method for processing a primary information object is provided which comprises the following steps, when the primary information object contains a graphical representation of a handwritten message: identifying image areas in the primary information object, the size of the image areas being based on display characteristics of a display on which the message is intended to be shown, and the image areas containing parts of the message; creating at least one secondary image object containing at least one of the image areas. This method can be utilized, for example, in a personal computer, which intends to send a handwritten message to a mobile station and has then advantages as described above.

According to a fifth aspect of the invention, a storage medium for digital information is provided which is readable by a computer system. The storage medium contains a program for processing a primary information object, which defines the following steps, the primary information object containing a graphical representation of a handwritten message: identifying image areas in the primary information object, with a size based on display characteristics of a display on which the message is in-

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tended to be shown, and the image areas containing parts of the message; creating at least one secondary information object containing at least one of the image areas. This software can be utilized, for example, in a personal computer, which intends to send a handwritten message to a mobile station and has then advantages as described above.

Brief Description of the Drawings

Fig. 1 shows in a simplified manner a mobile telephone system in which the invention can be used.

Fig. 2 shows schematically a general method according to the invention.

Figs 3a, 3b and 3c show steps in a method in a mobile telephone system according to the invention.

Fig. 4 shows a method in a mobile station, which receives a primary information object.

Fig. 5 shows a method in a first mobile station, which intends to send information to a second mobile station.

Fig. 6 shows a method for processing a primary information object.

Detailed Description of Preferred Embodiments

Fig. 1 shows in a simplified manner a mobile telephone system 101, 102, 103 in which the invention can be utilized, for example a GSM system with GPRS functionality. A primary information object, preferably a file containing a digital representation of a handwritten message, is then sent to a receiving mobile station 104. The

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sender can be a sending mobile station 105 but can also be other electronic equipment such as a personal computer 106.

In the case where a mobile station 105 is sending the information object, it is sent via the air interface 107 to a first base station 102. From there, it is sent via at least one switching node 101, a second base station 103 and then again via the air interface 107 to the receiving mobile station.

If, instead, the sender is an Internet-connected personal computer 106 or server, the message is sent via, for example, the public telephone network PSTN 108 and Internet 109 to a gateway node in the mobile telephone system. After that, it is sent on to the receiving mobile station 104.

The transmission of the information object is preferably done by packet data transmission. Thus, an information object is divided into a plurality of parts, which are transmitted one by one. The transmission of a packet can entail traffic in both directions, for example in accordance with the TCP/IP protocol.

A method according to the invention can be carried out at a plurality of locations in the system shown above. Thus, a method according to the invention can be carried out in the transmitting mobile station 105, in the receiving mobile station 104, in the transmitting Internet-connected electronic equipment 106 or in a node connected to the mobile telephone system (for example

101). Such a node can be especially provided for carrying out a method according to the invention. Corresponding arrangements can also be found at these locations.

Fig. 2 shows schematically a general method according to the invention. Firstly, a primary information object 201 or rather a printout thereof is shown. The primary information object 201 contains a handwritten message 202. The primary information object 201 is preferably a file. It can be a compressed file such as a GIF or JPEG file but it can also be a file of non-compressed format, for example a BMP or TIFF file. The handwritten message 202 implies that a number of pixels in the file, corresponding to memory elements, have changed state.

The graphical representation of the handwritten message can be preferably produced with the aid of an optical sensor, which is displaced over a base on which a position-coding pattern is printed. The optical sensor should then be adapted to detect absolute positions on the base by utilizing the position-coding pattern. A displacement of the optical sensor over such a base is then recorded as a sequence of positions, which correspond to the displacement. Such an optical sensor is preferably accommodated in a drawing device, which forwards position data to a computer system in, for example, a mobile station or a personal computer. The drawing device can be provided with a drawing pen with the result that said displacement is also recorded on the base in the form of an ink trace. Such an arrangement with base and drawing

device provides for inputting on a large area. Nevertheless, the drawing device can be made compact and the base can be, for example, a sheet of paper, which can be folded together. Preferably, the computer system is arranged in a mobile, pen-shaped unit, which includes the optical sensor, a computer, a memory and a communication device, such as a short-range radio link or an IR-(infrared)-link. The handwritten data is obtained in a vector format, which has relatively small size.

One position-coding pattern is disclosed in WO 00/73983 and another is disclosed in PCT/SE00/01667, which applications are included in the present specification by reference. A notebook in which a message, such as described above, may be generated is disclosed in WO/01/16691, the content of which is included in the present specification by reference.

When a system has knowledge of display characteristics of a mobile station 203 in which the message is intended to be shown, the system can divide the message in a manner suitable for the receiving mobile station 203. This is done by image areas 204, having a size, which is adapted to the display 205 of the receiving mobile station, 203 and which contain parts of the handwritten message, being identified in the primary information object. This is done by means of segmenting algorithms, which carry out segmentation at word level in a known manner. The algorithms thus identify image areas, which contain one word, or in certain case a number of words. The dis-

play characteristics can be advantageously made up of the number of pixels in the display along first and second right-angle directions of extension.

When relevant image areas 204 have been identified, secondary information objects 206 are created, such as files. The content therein is allotted the content in at least one of the identified image areas 204. The secondary information objects 206 can also be included as elements in a common file.

The secondary information objects can then be shown on the display 205 of the mobile station 203.

Fig. 3a shows steps in a method 300 in a mobile telephone system, where a node in the system is adapted to forward information to a mobile station, which is connected to the system. Each step in the method corresponds to means in an arrangement for carrying out the method.

A primary information object arrives at said node, the information object containing a graphical representation of a handwritten message. In a first step 301, display characteristics of the receiving mobile station are identified. After that, image areas are identified, in a second step 302, in the primary information object, which contain parts of the handwritten message, as shown above.

In a third step 303, secondary information objects are created, such as files, each of which has a content corresponding to at least one of the identified image ar-

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eas. These information objects are then conveyed to the receiving mobile station in a fourth step 304.

Fig. 3b shows a first embodiment of the first step shown in Fig. 3a. In a first substep 301a, an enquiry is sent to the receiving mobile station about characteristics of its display. In a second step 301b, such information about display characteristics is received.

Fig. 3c shows a second embodiment of the first step shown in Fig. 3a. In a first substep 301c, a hardware-identifying number relating to the receiving mobile station is obtained. This number can be made up of, for example, the so-called IMEI code (in a GSM system), which is know to the system. In a second step 301d, a lookup table is used which, using this number as input data, provides output data corresponding to the desired information relating to display characteristics.

Fig. 4 shows a method 400 in a mobile station, which receives a primary information object, containing a graphical representation of a handwritten message, from a mobile telephone system.

In a first step 401, image areas are identified in the primary information object, which contain parts of the handwritten message, as shown above. After that, a number of secondary information objects, which are allotted the content in the identified image areas, are created in a second step 402. In a third step 403, these information objects are shown on the display of the mobile station. This can also be done for one image area at a

time. It is not necessary to explicitly create a secondary information object, an identified image area can also be shown directly on the display of the mobile station.

Fig. 5 shows a method 500 in a first mobile station which intends to send information to a second mobile station which has certain display characteristics. The information is made up of a primary information object with content as above. In a first step 501 the first mobile station requests the display characteristics of the second mobile station. This can be done directly to the second mobile station, to an intermediate node which has knowledge of these display characteristics, or to an intermediate node which, in turn, requests them. In a second step 502, image areas are identified in the primary information object as described above. After that, secondary information objects containing the image areas are created in a third step 503. These are then forwarded to the second mobile station in a fourth step 504.

Fig. 6 shows a more general method 600 for processing a primary information object, such as a file. Such a method can be carried out, for example, in a personal computer which intends to transmit a handwritten message, written into a primary information object, for example, a mobile station having certain display characteristics. The method corresponds to instructions in the form of program steps stored in a readable information medium.

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In a first step 601, image areas in the primary information object, which contain parts of the handwritten message, are identified. After that, secondary information objects such as files containing the identified image areas are created in a second step 602.

The scope of protection is not limited by the embodiments described above. The invention can be varied and changed in a number of ways within the scope of the appended claims.

CLAIMS

1. A method (300) in a mobile telephone system, in which a first node connected to the system is adapted to forward incoming information objects to a mobile station registered in the system, c h a r a c t e r i z e d by the following steps, when a first primary information object arriving at the node contains a graphical representation of a handwritten message:

- identifying (301) display characteristics of said mobile station,
- identifying (302) image areas, with a size based on said display characteristics, in said first incoming primary information object, the image areas containing parts of said message,
- creating (303) at least one secondary information object containing at least one of said image areas, and
- conveying (304) said secondary information object to said mobile station.

2. A method in a mobile telephone system according to claim 1, c h a r a c t e r i z e d in that said identifying of display characteristics comprises the following steps:

- transmitting (301a) an enquiry about display characteristics to said mobile station, and
- receiving (301b) information about display characteristics from said mobile station.

3. A method in a mobile telephone system according to claim 1, c h a r a c t e r i z e d in that said iden-

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tifying of display characteristics comprises the following steps:

- obtaining (301c) a hardware-identifying identity number relating to said mobile station, and
- utilizing (301d) a lookup table for obtaining, with said identity number as input data, information about said display characteristics.

4. A method in a mobile telephone system according to any one of claims 1 to 3, c h a r a c t e r i z e d in that said display characteristics are made up of at least the number of pixels along a first direction of orientation and the number of pixels along a second direction of orientation on a display, the first and the second direction of orientation being essentially orthogonal.

5. A method in a mobile telephone system according to any one of claims 1 to 4, in which the content in said first primary information object is provided by displacement of an optical sensor in relation to a position-coding pattern, said sensor being adapted to detect absolute positions in said pattern.

6. A method (400) in a mobile station communicating with a mobile telephone system, the mobile station receiving information from said mobile telephone system, c h a r a c t e r i z e d by the following steps, when a first incoming primary information object contains a graphical representation of a handwritten message:

- identifying (401) image areas, with a size based on display characteristics of the mobile station, in said first incoming primary information object, the image areas containing parts of said message, and
- showing (403) at least one of said image areas on a display of the mobile station.

7. A method (500) in a first mobile station communicating with a mobile telephone system, the first mobile station sending information via said mobile telephone system, a first primary information object being intended to be transmitted to a second mobile station via the mobile telephone system, characterized by the following steps, when said first primary information object contains a graphical representation of a handwritten message:

- requesting (501) display characteristics of said second mobile station,
- identifying (503) image areas, with a size based on said display characteristics, in said first information object, the image areas containing parts of said message,
- creating (504) at least one secondary information object containing at least one of said image areas, and
- conveying (505) said secondary information object to said second mobile station.

8. An arrangement in a mobile telephone system, a first node connected to the system being adapted to forward incoming information objects to a mobile station registered in the system, characterized by,

when a first primary information object arriving at the node contains a graphical representation of a handwritten message:

- means for identifying display characteristics of said mobile station,

- means for identifying image areas, with a size based on said display characteristics, in said incoming primary information object, the image areas containing parts of said message,

- means for creating at least one secondary information object containing at least one of said image areas, and

- means for conveying said secondary information object to said mobile station.

9. An arrangement in a mobile station communicating with a mobile telephone system, the mobile station receiving information from said mobile telephone system, c h a r a c t e r i z e d by, when a first incoming primary information object contains a graphical representation of a handwritten message:

- means for identifying image areas, with a size based on display characteristics of the mobile station, in said incoming primary information object, the image areas containing parts of said message, and

- means for showing at least one of said image areas on a display of the mobile station.

10. An arrangement in a first mobile station communicating with a mobile telephone system, said first mobile station sending information via said mobile tele-

phone system, a first primary information object being intended to be transmitted to a second mobile station via said mobile telephone system, c h a r a c t e r i z e d by, when said first primary information object contains a graphical representation of a handwritten message:

- means for requesting display characteristics of said second mobile station,

- means for identifying image areas, with a size based on said display characteristics, and said primary information object, the image areas containing parts of said message,

- means for creating at least one secondary information object containing at least one of said image areas, and

- means for conveying said secondary information objects to said second mobile station.

11. A method (600) for processing a primary information object, c h a r a c t e r i z e d by the following steps, when the primary information object contains a graphical representation of a handwritten message:

- identifying (601) image areas in the primary information object, the size of the image areas being based on display characteristics of a display on which the message is intended to be shown, the image areas containing parts of said message,

- creating (602) at least one secondary information object containing at least one of said image areas.

12. A storage medium for digital information which can be read by a computer system, the storage medium con-

taining a program for processing a primary information object, c h a r a c t e r i z e d in that said program defines the following steps, the primary information object containing a graphical representation of a handwritten message:

- identifying image areas in said primary information object, with a size based on display characteristics of a display on which the message is intended to be shown, the image areas containing parts of said message,
- creating at least one secondary information object containing at least one of said image areas.

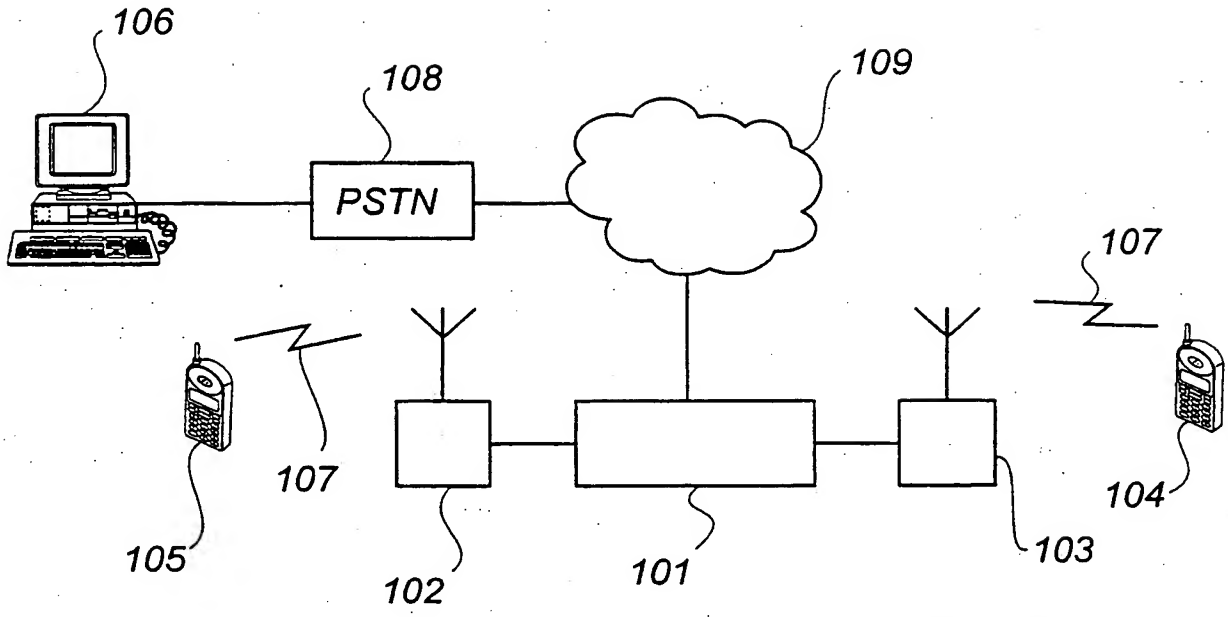

Fig. 1

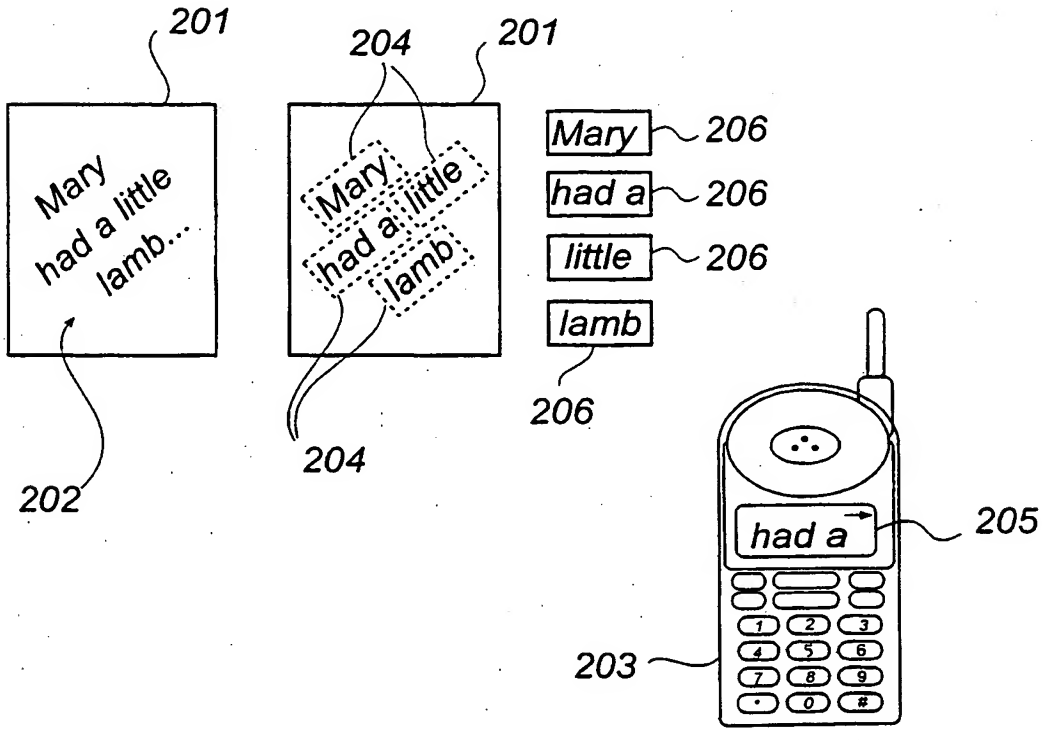

Fig. 2

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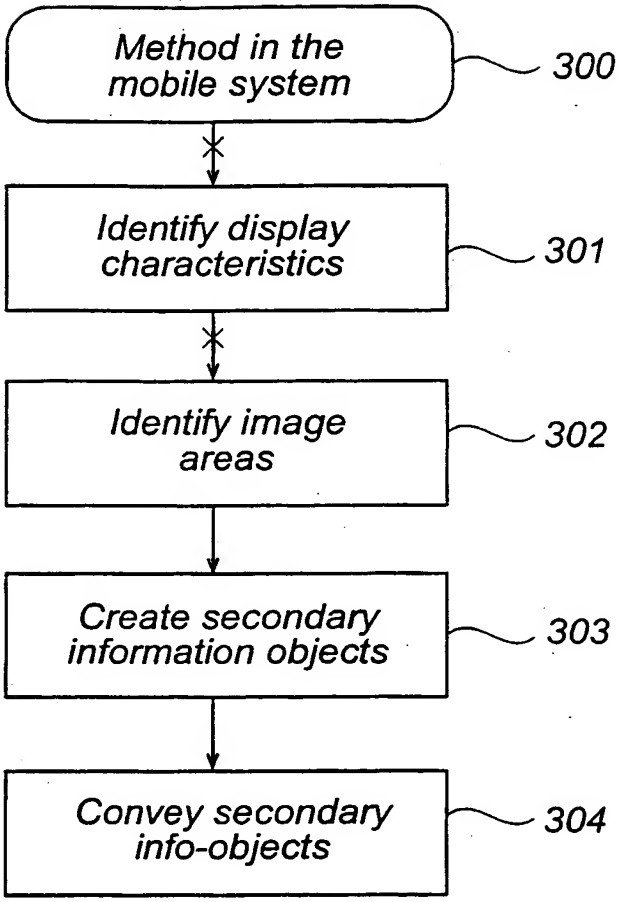

Fig. 3a

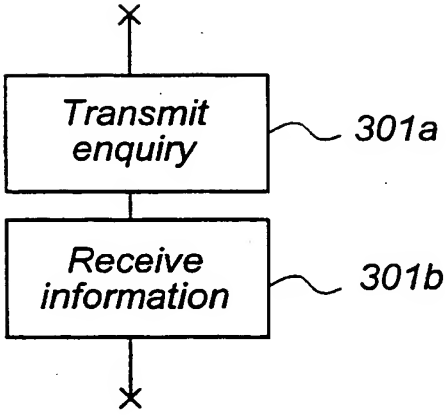

Fig. 3b

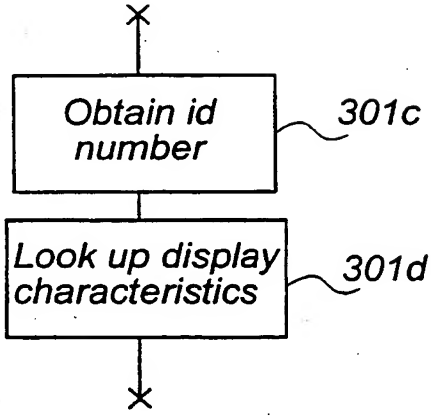

Fig. 3c

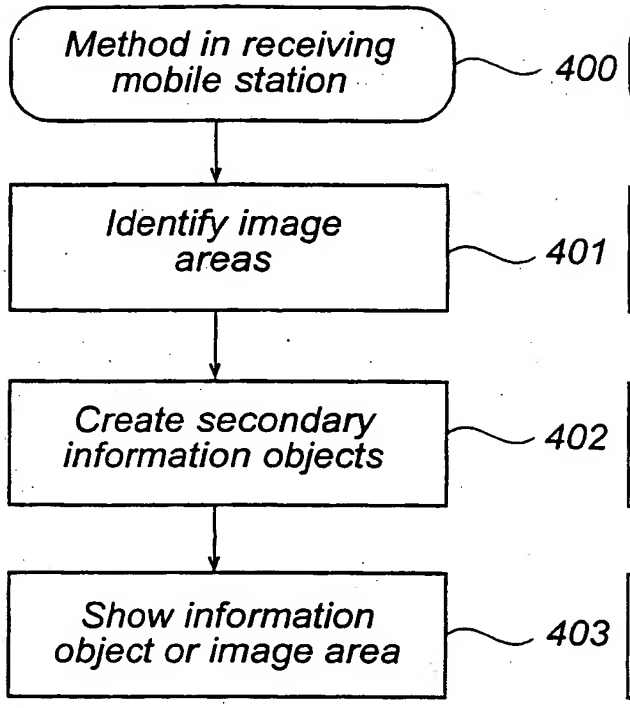

Fig. 4

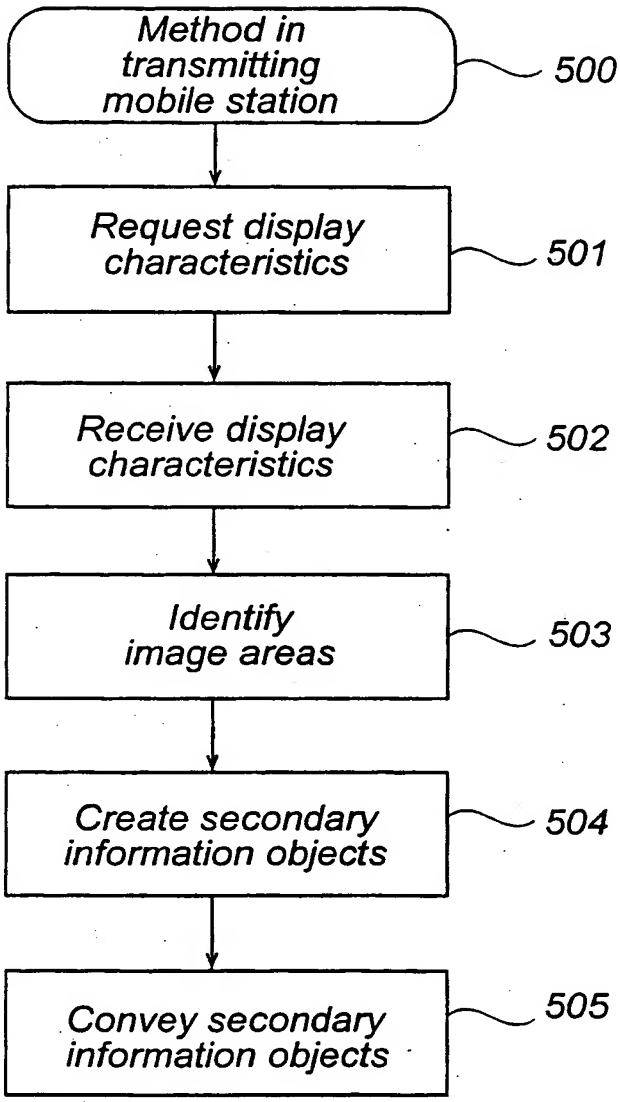

Fig. 5

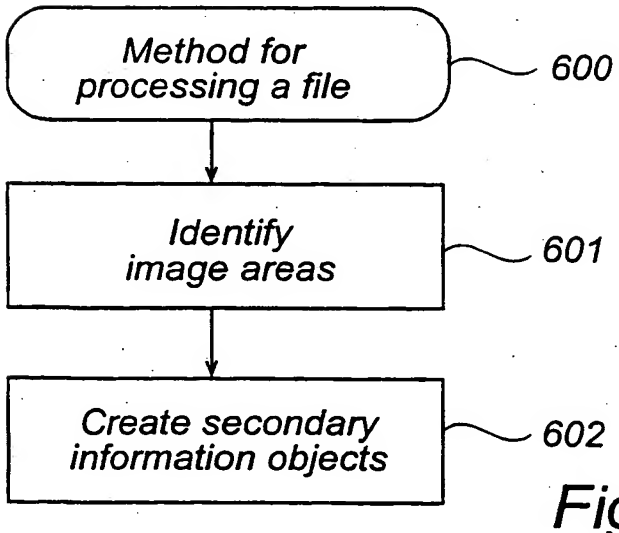

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/00583

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06K 9/46, H04N 1/387, H04Q 7/32
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04N, G06K, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 19707502 A1 (SIEMENS AG), 3 Sept 1998 (03.09.98), column 1, line 5 - column 2, line 30	1-4,6-12
Y	EP 0896491 A1 (ALCATEL ALSTHOM COMPAGNIE GENERAL D'ELECTRICITE), 10 February 1999 (10.02.99), column 9, line 13 - line 54, figure 3	1-4,6-12
A	US 5852434 A (SEKENDUR, O.), 22 December 1998 (22.12.98), the whole document	5

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2001	17 -07- 2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jesper Bergstrand /OGU Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

Information on patent family members

02/07/01

International application No.
PCT/SE 01/00583

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